3. One important feature of the new dynamics is that its equations are usually nonlinear.

4. One might have guessed that it was due to the linearity of the Schrödinger equation, but this does not seem to be the case; see Davies 1989, 369.

5. J. Ford's article (in Davies 1989) contains a good account of the problem of quantum chaos.

6. There are connections here with Bowker's notion of religions as systems; see Bowker 1987, 112–43.

7. There are obvious connections with the dialectical theism of Macquarrie (1984).

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SEARCH FOR BELIEFS TO LIVE BY CONSISTENT WITH SCIENCE

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by R. W. Sperry

Abstract. Instead of separating religion and science into "mutually incompatible realms," the new macromental paradigm of behavioral science permits integration of the two within a single consistent worldview. A new form of causal determinism combines conventional "bottom-up" with emergent "top-down" causation. Traditional materialist tenets are overturned, along with the science-values dichotomy, clearing the way for a science-based value/belief system. Intrinsic ethicomoral directives emerge in which a revised sense of the sacred would help protect the evolving quality of the biosphere, and the rights and welfare of future generations. Subsequent versions of today's changing worldview raise questions of which interpretation to believe. An analysis of "New Age" thinking is called for, and a brief attempt at such analysis is included.

Keywords: consciousness revolution; emergent causation; macromental paradigm; mind-brain relation; New Age; religion-science tension; science-values dichotomy; spirit.

With a scientist's faith in empirically verified truth and a long commitment to research in the brain, behavioral, and life sciences, I spent most of my working years accepting the scientific accounts of the nature and origins of life and the universe. If science said that human life is lacking in any ultimate purpose, value, or higher meaning—that we and our world are driven merely by mindless, indifferent physical forces—I was prepared to face this. Like many scientists, I preferred to seek out and confront the truth, however

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Author's note. This article responds to a request to write a nonspecialist, personalized account of the beliefs I live by as a scientist and how I arrived at them. Planned for a popular volume, the original version (Sperry 1986) is here expanded and updated for readers more professionally concerned with relating religion and science. I thank Robert Doty, Charles Hamilton, and Colwyn Trevarthen for helpful comments on the manuscript, and Patricia Anderson for assistance in compiling the references.

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harsh, than to live by false premises and illusory values. The more I learn about the workings of the brain and how it processes information, the stronger becomes my allegiance to the type of truth that receives consistent empirical validation in the outside real world.

Nevertheless, without abandoning or compromising scientific principles, I have come around almost full circle today to reject the type of truth science traditionally has stood for, along with its dominant central tenet that everything in our universe, including the human psyche, can be accounted for in terms entirely physical—that science has absolutely no need for recourse to conscious mental or spiritual forces. As a brain scientist, I have come to believe in the reality and power of conscious mental/cognitive entities of the mind or spirit and the indispensability of their causal control for both brain function and its evolution—and that science has been wrong all along in its categorical denial of this. In particular, I take the subjective value-belief system of the brain to be a powerful intrinsic force that, above any other, shapes human culture and the course of affairs in the civilized world.

This turnabout in my system of belief began with some changed ideas about consciousness and the fundamental relation of mind to the physical brain. It soon became apparent that if these revised mind-brain concepts were to hold up, they would transform our scientific views of both human and nonhuman nature and of the kinds of forces that control them, with wide-ranging humanistic as well as scientific consequences. Among the many ideologic and value-belief consequences, I could foresee the foundations for a naturalistic "global ethic" for all nations and cultures, based in the neutral universality and credibility of science: an ethic promoting values that would tend to preserve and enhance, instead of destroy, our world. The bottom-line message that emerged said we should be looking to science to save the world, not through more or better technology (which would only stave off and thereby magnify our impending downfall) but, instead, by providing reformed value-belief guidelines to live and govern by.

As these and other ramifications began to unfold, I found myself drawn more and more away from the world of the laboratory and split-brain research and toward these more compelling and timely issues. Our experiments to determine whether different mental states are more left or right hemisphere, though still intriguing and productive (Trevarthen 1990), began to seem less crucial in the light of our worsening global predicament and imperiled future, especially when compared with the new issues being raised by the idea that mental states have an interactive causal role. By the

1970s, this causal view of mind had become the center of a paradigm battle in behavioral science, with a possibility of further spread into all science. Meantime, as more implications continued to unravel, and with the left-right research already well under way, I decided it would be better to shift my top priority in order to concentrate on the issues of consciousness and mental causation.

Many people fail to see how a "save the world" strategy derives from a concept of consciousness in relation to brain physiology. The answer, put very simply, goes as follows: The fate of the biosphere will depend on human value priorities, which will depend upon assumptions about human life and its meaning—which the new theory modifies in critical ways. The new view of consciousness radically revises the kinds of beliefs upheld in science about ourselves and the world, with conceptual impacts that reach deeply into religion, science, philosophy, and social priorities in general.

Consciousness pervades nearly all aspects of the human enterprise. Everything ever known or felt, seen, heard, believed, imagined, or experienced in any form has to be processed through this universal medium, the conscious mind. Conveyor of all our values, our sense of purpose and meaning, of right and wrong, of beauty, joy, and so on, consciousness is central to all that matters most in life. Any basic revision in its conception, therefore, or in its role, or how it relates to the physical brain or to outside reality is bound to produce sweeping reverberations. An implied answer, for example, to just the one question, "Is consciousness mortal or immortal?" would have repercussions in all dimensions or levels of the social structure.

The shift from a noncausal to a causal view of consciousness, asserting that subjective awareness counts and makes a real difference in the physical world, has enormous and far-reaching implications. It abolishes the traditional science-values dichotomy and leads to a new resolution of the old free will–determinism paradox (Deci 1980; Grenander 1983). The very nature and causal influence of belief itself is changed.

Subjective belief, in our new theory, is no longer a mere impotent epiphenomenon of brain activity. It becomes a powerful impelling force in its own right. From the standpoint of the brain's functional organization and cognitive processing, one can hardly overrate the commanding, central-control influence of the human belief system as a shaper of both individual and social behavior. What we believe determines what we value, what we choose, how we act, and what we decide in social policy-making. It is no surprise that our current global crises, viewed historically, can be ascribed in no small part to the kinds of religious beliefs that have long prevailed (White 1967).

I think human destiny and the fate of our whole biosphere hang critically on the kinds of beliefs and values the next few generations (let us hope, to come) elect to live and be governed by.

The beliefs that count most are not those about ordinary, day-to-day concerns and basic subsistence, but the higher religious, philosophical, and ideological beliefs: the kind people live and die for—beliefs that concern life's purpose and meaning, beliefs about God, and the human psyche, and its role in the cosmic scheme. Such beliefs determine a society's judgment of how things ought to be in the world, the cultural sense of value, of moral right and wrong, and of social justice. Any belief about the ultimate value and meaning of life tends to condition all subsidiary values throughout one's value hierarchy. The force of an overriding worldview belief system in thousands of millions of minds, determining how people think, what they value, and what they decide, shapes the course of history. It is important that we try to perceive the role of such belief systems in creating the current precarious state of the human condition.

Two Great Credos in Conflict

Trouble comes, as daily headlines and history affirm, when such powerful movers and shapers of the human endeavor come into conflict, either with each other or with reality. Despite great advances in our knowledge about the cosmos and the ways of human and non-human nature, belief systems around the world remain so diverse, and even incompatible, that if we accept as true the cherished beliefs of one people, it follows that truths upheld as sacred by other peoples must be false or misleading. While there appear to be advantages in a healthy religious diversity, belief differences, carried to the extent of mutual incredibility and civil intolerance, become a major cause of world conflict —not to mention serious doubts about which of the various versions of belief represents real truth.

Probably the widest, deepest rift in contemporary culture, and the source of its most profound conflict and mutual misunderstanding, is the incompatibility that separates the two great credos of our time: science and mainline religion. Two fundamentally opposed views of existence are upheld, in two totally different reference frames for "truth." Science asks us to accept a purely impersonal, materialistic, mass-energy account of the cosmos. Religion, on the other hand, demands faith in the opposite: in a universe infused and dominated by spiritual intellect, caring, and intentionality. As emphasized by Andrew Greeley (1986), Francis Schaeffer (1981), and many, many others (see Jones 1965; Provine 1988), it comes down to a choice, in

the last analysis, between these two great antithetical conceptions o ultimate reality: a universe with a supreme plan, spiritual values purpose, and higher meaning, or a spiritually void, value-empt cosmos, governed throughout by quantum physics.

For me personally, as a scientist, the salient aspect of this conflic has been that science, so demonstrably successful and in touch witl reality in most respects—and which otherwise I regard as the prove best, most credible approach to truth we have—teaches that we an our world are but the product of a passing fluke of physics, utterl lacking in any ultimate purpose or meaning (Provine 1988). Scienc insists that there is no real freedom of will or choice, nor any actua moral right and wrong—that ours is a deterministic universe ir which the flow of events is causal and inexorable. Science tells us further, that the entire conscious content of the life experience i merely an accessory artifact, a superfluous by-product of brai activity, with no effect whatever on the sequence of events, either ir the brain or in the real world—an impotent epiphenomenon tha initially arises out of, and in the end sinks into, oblivion.

In any case, it is painfully evident that present-day civilizatior is obliged to operate from two very different and irreconcilable frameworks of ultimate belief. One lacks credibility in the light o modern science; the other is repellent in humanistic appeal and flie in the face of everyday experience and common sense. In copin with this dilemma, I followed for many years the usual practice o accepting each scheme within its realm, but keeping the two alternatives strictly separate. When matters of moral, religious, or related humanistic concerns were involved, my scientific convictions had to be set aside. Conversely, in matters of the laboratory, any mental or spiritual explanations were emphatically excluded.

This double standard has pervasive political and legal manifestations. It is involved in the separation of church and state and is widely endorsed throughout Western society. The U.S. National Academy of Sciences introduced its 1984 booklet, *Science and Creationism* (Press 1984), with a formal pronouncement that "religion and science are separate and mutually exclusive realms of human thought whose presentation in the same context leads to misunderstanding of both scientific theory and religious belief."

As a brain-behavior scientist concerned with the brain's modes and methods of cognitive processing, I find this kind of double thinking leaves much to be desired. If two systems of belief concerning such vital things as the nature, origins, and destiny of all life and the universe, and the kinds of forces in control, are perceived to stand in direct contradiction to each other, and indeed to be

"mutually exclusive," then certainly something must be seriously wrong!

A Better Way to Go

During the past twenty-five years I have become increasingly convinced that there is another, better alternative. I can see another kind of answer to this dilemma, a third choice, based in a different conception of ourselves and the natural world that emerged from my revised view of consciousness and how it relates to the workings of the physical brain. A different scientific mode of thinking is involved, specifically, a different conception of causal explanation. It brings a different, "compromise" view of the kinds of powers that govern the universe and created humankind.

Incompatible objective-vs.-subjective frameworks of the past are reconciled in a unifying, intermediate position that departs from previously accepted philosophical dichotomies. Standard philosophic terms must be given new meaning, or new terms must be invented (Ripley 1984). Features from both sides of the old dichotomy—the mental and the physical, fact and value, subjective and objective, freedom and determinism—are blended, without contradiction, within a single, consistent, worldview synthesis (Natsoulas 1987; Sperry 1988, 1990).

In practice, the outcome means that I have no longer been obliged to vacillate between two mutually antithetical schemes for ultimate reality. Instead, I can rely only on this single third choice, which preserves and integrates what seem to me the most credible aspects from each of the earlier views. On one hand, it relinquishes dualistic supernatural beliefs, such as unembodied minds or spirits. On the other, it denies that the traditional (reductive physicalist) accounts of science have been giving the true story.

After more than a quarter century, I find that this "third choice" continues to measure up to its initial impression as a valid reconciliation of earlier polar disparities in a consistent, long-sought unifying view of man in nature (Sperry 1965)—a credible and functional worldview of a kind I can live and work with. Since using this new reference frame, with its intrinsic, almost self-evident global ethic (outlined later), I have much less trouble perceiving moral solutions, for example, to issues between fundamentalists and secular humanists, prochoice versus prolife factions on abortion, environmentalist interests versus those of human subsistence, animal rights issues, and so on. Further, I no longer need to keep my religion and my science separate.

This new outlook on existence did not come out of any quest on my part for new beliefs but arose as the unforeseen, secondary result of a long search for a better answer to the age-old mind-brain problem. Wrestling with questions of conscious unity back in the 1960s, in the surgically separated hemispheres of split-brain animal and human subjects, we were forced to view the relation of brain to conscious awareness in new, more direct ways. In the course of applying and comparing the merits of the available mind-brain theories, I discovered that our long-trusted, supposedly irrefutable and airtight logic for banning consciousness from explanations of brain function rested, in fact, on an unrecognized logical oversight or shortcoming. On further analysis, the whole case for excluding consciousness proved to be outweighed, in my own mind at least, by a newly perceived reasoning about causation.

This new reasoning does not change older assumptions regarding the chain of causation at neurocellular levels in the brain. In cognitive processing, however, these neurocellular events are seen to be enveloped within, and thus controlled by, higher-level types of causal phenomena. In a train of thought, for example, the causal progression is determined at each step by the holistic network properties of mental images, percepts, insights, cognitive associations, and the like, thereby obliging the constituent neurocellular components to fire in patterns determined largely at conscious mental levels. It is an unproven, but widely accepted, assumption of this hypothesis that the conscious qualities are irreducible emergent properties of a special class of brain processes which are conceived to have their own special dynamics.

In brief, the new answer hypothesizes that conscious experience appears in the causal chain of brain activity at upper (i.e., cognitive) levels of brain processing in the form of irreducible emergent properties. These emergent mental entities are conceived to interact on a holistic, "functionalist" basis at their own cognitive level in brain integration, and also to exert a concomitant supervenient form of downward control over their constituent neurocellular activities. In contradiction to prior behaviorist doctrine and that of neuroscience, the subjective qualities of inner experience become ineliminable causal contructs for explaining conscious behavior. In effect, the mind is put back into the brain of objective science (see Sperry 1965, 1990). A different model of causal determinism is invoked that combines traditional bottom-up with emergent top-down causation in a "reciprocal" or "doubly determinate" form of hierarchic control.

Though contradicting the reigning presuppositions of the 1960s

about causality in brain science, this revised view of brain function gave more satisfying answers to split-brain issues concerning unity of the mind and the conscious self (Bogen 1986; Trevarthen 1990). Instead of concluding, for example, that the normal intact brain must have two separate, left and right minds (harboring, in effect, two separate conscious selves), I could think of conscious experience in the intact brain as an overriding unified entity that normally is "different from and more than" the sum of the conscious experience of the two separate hemispheres. It followed, further, that the unified subjective intent must causally program the patterns of neuronal firing within each hemisphere without interfering with the physical or chemical laws of the neuronal processing at physiological levels.

Most importantly, this revised view provided a breakthrough in our reasoning about causation, a way out of the logic in which science had been locked for more than two centuries and which had forced us into the reductive materialist-behaviorist worldview. The new holistic, emergent downward-control reasoning provided a legitimate, rationally sound way to circumvent the logic of the conventional microchain of causation without violating the empirical principles of science. Though the day-to-day practice and methodology of science are little affected, the kind of life-view science stands for is vastly changed. What previously had been a rigorously objective, atomistic, value-free, and purpose-devoid cosmos is now infused with a new subjectivity and intentionality.

My turnabout on consciousness was thus not so much a product of particular research findings as a coming together in a new light of previously separate threads of thought. For example, I had been teaching evolution in terms of downward causation for years but had not applied it to the riddle of consciousness until I was forced to think in new ways by our split-brain studies, in which surgical midline division of the brain was found to correspondingly divide the mind.

The shift of mental qualities from a noncausal to a causal status demanded basic revisions in our prior materialist/behaviorist convictions. Brain function could no longer be thought to be fully explainable in terms of its chemistry or molecular biology. The higher organizational network properties must also be included as irreducible control factors. Instead of excluding mind and spirit, this view retains all the rich subjective qualities as integral and ineliminable functional agents—not, of course, in any disembodied, free-floating, or ethereal form but as holistic properties in upper-level brain processing. The long-banned subjective states and qualities are now put up front—in the driver's seat as it were—as a crowning

achievement of evolution (Sperry 1965) and are given primacy in determining what a person is and does.

Not only within the brain but throughout the natural world the same basic principle of emergent causal control applies. The more highly evolved "macro" or holistic properties at all levels gain added status and legitimacy in science as irreducible and ineliminable causal entities in their own right, exerting downward control over their lower, less-evolved components. The "mental" is just a special instance of this universal macrocausation, but sufficiently special to merit separate mention. Bottom-up microcontrols are retained throughout but are no longer exclusive.

Trial Tests

My first attempt to act on these newfound beliefs was to test them in the marketplace of professional opinion through lectures and articles (Sperry 1964, 1965). Definitive proof was not the object, any more than proof had been obtained for the preceding behaviorist or materialist paradigms. Even so, I believe that someday we will obtain convincing demonstrations, at least for the general principle of emergent causation, by closing in on the issues, using simple mechanical models such as a rolling wheel (Klee 1984; Smart 1981). The best I could do at the time, however, was to put the ideas in print, where the new reasoning could be pondered, weighed, and analyzed from different specialist angles by thousands of critical minds.

The majority feedback over an initial four-year trial period encouraged more formal presentations within neurology, philosophy, and psychology, and to our National Academy of Sciences (Grene 1969; Sperry 1969, 1970). The abrupt swing in American psychology shortly thereafter, away from the long-dominant behaviorist doctrine denunciating mentalism to acceptance of subjective mental phenomena as legitimate causal constructs for scientific explanation (Dember 1974; Matson 1971; Palermo 1971; Pylyshyn 1973; Reese and Overton 1972; Segal and Lachman 1972), was most reassuring.

This conceptual turnabout of mainstream psychology in the early 1970s (the so-called cognitive, consciousness, mentalist, or humanistic revolution) meant that the causal view of consciousness had been lifted out of the realm of mere philosophic conjecture into that of the history of science. Whether the test of time proves it right or wrong, the new paradigm already has replaced behaviorism and has reigned for nearly two decades as the dominant working conceptual framework for the whole scientific discipline that specializes in mind and

behavior (Baars 1986; Gardner 1985; Sperry 1987).

Meanwhile the more basic sciences, such as physics, chemistry, and molecular biology, have continued to adhere (predominantly) to the traditional bottom-up microdeterminism. The result is that we now have, within science and philosophy, two competing, fundamentally opposed paradigms for causal determinism. One opposes, while the other affirms, emergent causation: the irreducible, holistic interaction and downward control by the higher, more-evolved forces of nature over their lower, less-evolved constituents.

In simple terms, the dispute comes down to whether a newly evolved whole (entity or system) interacts entirely through the properties of its component parts or whether its interactions are also governed by novel emergent properties of its own as a whole which, at the same time, carry along and thereby control all the parts. In the brain, it is a question of higher mental over lower neuronal properties, but the issue is universal. Ultimately, it's a question of the types of forces that are in control in our world and within ourselves—the forces that made and move the universe and created humankind.

Competing Paradigms in Science

On one side, in accord with traditional microdeterminist views in science, we and all our thoughts, behavior, and decisions, as well as everything around us, are controlled from below by strictly physicochemical forces that reduce ultimately to quantum physics. Everything in the brain and elsewhere is subject to the laws of physics and chemistry. There is no freedom, no choice, no values, no intention, no moral priority. All such are merely subjective epiphenomena of mind which may parallel, but in no way causally influence, the course of physical events in the brain or in the natural world. "Mind does not move matter" is the familiar bottom line for this classic position, or "No physical action waits on anything but another physical action."

On the other hand, if our new mentalist thinking is correct, the physical and chemical forces in the brain, though still present and operating as before, are enveloped or embedded within, and thereby controlled and programmed ("pushed and hauled around" [Sperry 1965]) by the higher laws and dynamics of conscious and subconscious mental processes. The more highly evolved, "macro," or holistic mental properties of brain action determine when, where, and how the component molecular events will occur, but without interfering with the physicochemical laws at the molecular level—much as TV or computer programs shape patterns on the viewing screen without interfering with the physics of the system.

Brain-cell excitation, in this view, no longer waits solely on bio physical forces but also obeys a higher command, involving subjective feelings, wants, choice, intentions, moral values, and all other "things of the mind." The subjective events of mind and consciousness have their own dynamics and laws of causal progression. These transcend and control the events of brain physiology in an enveloping supervenient sense—at the same time that they are determined by them. This reciprocal, two-way control in opposing directions is not in conflict because different forms of causation are operating in the upward and downward directions.

Following adoption of the mentalist paradigm in psychology, with its new approach to causal explanation, the central idea was soon incorporated into systems theory (Laszlo 1972) and has since been gaining ground in science and philosophy. Even physics, the long time bastion of opposing materialist doctrine, has in the past decade started a swing in the same direction (via "chaos" and computer science). The macromental paradigm has thus come to pose a major challenge to traditional micromaterialist principles of explanation and knowing. Review of the chronology reveals an ironic twist in that psychology, long put down by the more physical sciences, should now be the first to adopt what promises to be a more valid basic paradigm for all science.

As things stand, I no longer need to believe, as a scientist, that I and my world are governed solely from below upward through the "fundamental forces of physics" in a totally mindless and purposeless cosmos, indifferent to human concerns. In our new downward-control paradigm we are moved and surrounded in the modern world by higher, more-evolved vital, mental, cultural, and other social forces. The forces embodied in politics, religion, education, business, and so on are full of purpose, caring, value, and meaning and are interpreted to be just as real and causal as the properties of molecules and atoms. In our new reasoning these higher, more-evolved forces of nature and all reality are given their due, as well as physics and chemistry.

The resultant new emphasis for science is not on the ultimate subatomic building blocks of creation but on the supersedent properties of the new forms, patterns, and shapes into which the building blocks are successively assembled. I can still believe, for example—despite quantum physics—that the proverbial solid table is just as solid and hard as ever and, regardless of having similar subatomic makeup, is very unlike soft pudding. All in all, the result is a vastly

transformed scientific view of both human and nonhuman nature. A kind of cosmos and vision of reality are upheld that, to me, seem much more credible and satisfying than either of the earlier, more polar views.

Science-based Moral Code: A Global Ethic

This intermediate outlook, moreover, though based in the worldview and truths of science, no longer clashes with common experience nor with traditional views in the humanities, nor is it incompatible with liberal nondualistic religious belief and values. Subjectivity and the qualitative aspects of reality are no longer shut out. A sense of higher meaning is provided in the cosmic scheme of things, with rich value and moral directives.

In these and other ways, the consciousness revolution has turned around the traditional science-values dichotomy and is thus, in effect, also a *values* revolution. Further, the scientific about-face on consciousness is one of the few scientific revolutions that also qualifies as a combined *ideological* revolution, in the sense described by Karl Popper (Popper 1975). The overall outcome is that, for the first time, our most advanced scientific theories need no longer be kept separate from religious values in "mutually exclusive realms" of human thought (Byers 1987; Pugh 1977; Rottschaefer 1987, 1988; Sperry 1988).

The most precious and sacred things in life are no longer reduced to subatomic physics or set apart in another, dualistic existence. Transcendent guidelines for judging moral right and wrong are established in terms consistent with mainstream science. Humanity's creator becomes the vast interwoven fabric of all evolving nature. The creative forces and creation itself are inextricably interfused. What is done to one is done to the other, making it immoral, even sacrilegious, to degrade earthly existence or to treat it as only a way station.

The implicit "supreme plan for existence" by which morality is judged (Fletcher 1987) becomes the grand design of the evolving cosmos itself, with special focus on our own evolution (Sperry 1972, 1983). Evolution, no longer seen to be governed merely from below by chance gene mutations, becomes a gradual emergence of increased direction, purpose, and meaning among the forces that move and govern living things. The highest good is an ever-evolving quality of existence, and an open-end future becomes a *sine qua non* for higher meaning. Extinction of humanity in the absence of other-worldly preservation would mean the entire human enterprise and all the eons of creation that went into it sink into meaninglessness (Provine 1988). A strong moral basis emerges, on these and related grounds, for environmentalism, population control, conservation, and other mainstays of sustainability and quality survival.

Combining such considerations with the inherent system of values already inbuilt in human nature by evolution and forming a basic common denominator from which all human value systems are built (Pugh 1977), I arrive at a system of beliefs and associated values that by its very nature carries intrinsic ethicomoral directives. My ultimate criteria for meaning and value, and for how things ought to be in the world—for what is ethically right and wrong and what is most sacred—are accordingly based on this single integral reference frame, consistent with empirically verifiable reality and the worldview of science in its reformed macromental description. In a sense, the theologist's "divine will" translates into that which is in harmony with and contributes to the creative pattern of evolving nature, and thus works with the forces that made and move the universe and created humankind. Evolving nature is assumed to include human nature, not only the biological but also its cultural aspects, extending into the highest aesthetic and spiritual dimensions of the human psyche.

In simple terms and for practical purposes, the measure of the good and morally right becomes the extent to which the quality of this-world existence is preserved or improved in an enduring, transcendent perspective. The reference here is not to my own existence, or to yours, or to this or that nation's, or even to this or the next generation's—though it may be, and usually is, all of these. When conflict arises between the "rights" of this or that individual, nation, or species, however, a higher standard for resolving right and wrong is needed and becomes the quality of existence in a broad, long-term, transcendental (eternal, evolutionary, or "godlike") perspective.

Most people readily agree that this criterion (enhancing the evolving quality of life) accords with common intuition, that it is almost obvious. It is not, however, a simplistic measuring stick. Diversity, contrast, competition, and even conflict and death play vital roles in the evolutionary advancement of the quality and meaning of life. Goodness and morality would lose meaning if everyone were good and moral all the time—just as humanity is bound to undergo a profound loss in meaning if our world is turned into one vast human habitat, designed throughout to sustain a maximized, homogenized human population.

As with any ethical system, only broad principles are stated, leaving the need for debate and judgment in settling specific issues.

Assessment of moral priority, however, becomes much more subject to constructive discussion once agreement is reached regarding the ultimate criteria and highest good. In the present scheme, moral values are not absolute or immutably prefixed, or preconceived by either natural or divine law. Instead, like other values, they are evolutionary, interrelated, and conditional on the context in which they evolve and are applied.

Such a moral code, based in the credibility and universality of scientific truth, would seem to be something a sufficient majority of nations and peoples might be willing to compromise on as a common-core foundation for world law and justice and international policy-making, for control of nuclear devices, of pollution of oceans and atmosphere, and other steps to maintain world order and an evolving quality of life—perhaps through world federation. The kind of global ethic that is visioned—much more than with otherworldly guidelines or more anthropocentric humanistic, hedonistic, or relativistic ethics—could help to combat the looming crises in our worsening world conditions. As a prescription for the plight of the planet and the human predicament (Sperry 1972, 1988), it provides a single (noncatastrophic, even humane) remedy directed at the root cause.

Emerging New World Outlook: Alternative Views

It remains to mention some other recent proposals along similar lines. Once the rationale for refuting the traditional materialist ideology was evident and established in behavioral science, it was not long before other variations for a new worldview began to appear (e.g., Augros and Stanciu 1984; Berry 1988; Bohm 1982; Capra 1975, 1983; Birch and Cobb 1982; Harman 1988; Kaufman 1985; Lazlo 1972; Peacocke 1979; Popper 1972; Popper and Eccles 1977; Prigogine and Stengers 1984; Starr 1984).

Nearly all of these proposals appear to depend, either explicitly or implicitly, on the overthrow of traditional materialist doctrine in favor of a more holistic paradigm. The proponents, however, instead of ascribing the changeover to the turnabout on consciousness and emergent causation, as done here, advance other grounds for their outlook. Quantum physics is cited frequently, for example, as are ecology, systems theory, panpsychism, process philosophy, nuclear annihilation, economic theory, and so on. Most of these proposed new outlooks are also said to have important, even vital implications for social reform and the acquisition of more sustainable values.

Accordingly, it is a matter of some concern to appraise the differences in these alternatives, along with their futurist implications. Although this is not the place to undertake a full assessment of their many pros and cons, these proposals have so much in common that a point-by-point comparison of any one will serve to illustrate many of the main issues and the general type of arguments. One proposal that seems in overall outlook to come close to the view presented here, and which has had wide popular influence and acclaim, is that of Thomas Berry (1988). Moreover, its outlook is quite broad, enabling fairly extensive comparisons.

The answer to our worsening global predicament is seen by Berry, like the others, to lie in reformed values and beliefs (and resultant changes in behavior, aims, social priorities, etc., based in a revised conception of nature and all reality, arrived at through reinterpretation of the scientific evidence. When I tried, over twenty years ago, to suggest that we could look to science for more realistic and sustainable values (Sperry 1965, 1972), my proposal was strongly rejected on principle, by both ethicists and scientists. Mainstream science in 1970 still prided itself on being materialistic and value free, while ethicists still honored the fact-value dichotomy. By the late 1970s, however, and especially in the '80s, we were in a new era with respect to values (Edel 1980; Rottschaefer 1988). Specifically, the idea that ethicomoral values can be derived from the worldview of science had become not only acceptable but almost an unquestioned starting assumption for many of these new proposals.

In general, again like the view presented here, Berry also gives ultimate respect to the natural forces of creation, referring to his "new story" as "creation-oriented," in contrast with dualistic, otherworldly oriented theology (Berry 1988). As a Christian monk and gifted historian of culture, Father Berry is able to express this position more persuasively than most of us in science, adding rich insights into the historical and cultural background. Before probing the basic differences in our views, I list some of the many points of agreement to be kept in mind as we focus on points of contention:

Points of Similarity

1. A changed sense of the sacred is centered in the natural world, as opposed to dualistic schemes, and is held to be consistent with a reconceived cosmology of science.
2. Traditional materialistic thinking is replaced by an emergent, holistic approach in which the worldview of science is infused with a new subjectivity and with rich macroqualities.

3. The growing chasm between the "two cultures" of the humanities and the sciences is bridged in an integrated new worldview that restores due emphasis on the humanities.
4. Some basic incompatibilities between the reference frames of religion and science are reconciled in a unifying worldview.
5. Today's global crisis is attributed in large part to inadequate mind-sets of the past, both in religion and in science.
6. A new outlook on existence is called for—a new *Zeitgeist* with a new ethic and a changed sense of ultimate value. Adoption would lead to fundamental social change and improved prospects for quality survival.
7. Anthropocentric values are replaced by more biospheric priorities in a shift from human-centered norms to nature-centered norms.
8. The proposed value-belief system is of a natural, neutral, nonexclusive type, with potential for acceptance by different ethnic, cultural, and national communities.
9. A new or changed concept of evolution, driven more holistically (Sperry 1964) or more numinously (Berry 1988), is more directed, and less subject to chance and accidents of genetic mutation.
10. The careless exploitation and despoiling of earth becomes immoral, as does demeaning and trivializing other species, to say nothing of forcing their extinction.

(Other lesser points and shades of similarity are apparent on examination.)

Differences between our two views lie principally in the means by which the foregoing similar features are arrived at and justified. Instead of relying on the consciousness revolution and resultant new mentalist paradigm, Berry uses what he calls the *principle of subjectivity,* known otherwise as *panpsychism,* a teaching that everything in the universe has a psychic/spiritual, as well as material, component. Berry refers to "the interior subjective numinous aspect of the entire cosmic order," to "the universe as a psychic-spiritual as well as a material-physical reality from the beginning" (Berry 1988, 81), and to "the numinous and consciousness dimensions of the emergent universe from its primordial moment" (Berry 1988, 120).

This idea of an interior psychic aspect even in inorganic nature is ancient, and its modern adherents include Lloyd Morgan, Alfred Whitehead, Teilhard de Chardin, and the followers of process philosophy. No definitive proof or disproof is available. Panpsychism, however, has not succeeded in the past in overthrowing the doctrine

of scientific materialism because it does not alter its purely physical laws and equations. The psychic element is present, supposedly, in parallel and is not causally interactive. Berry's and any other view that purports to replace the "old story" of science with a new one needs to have a strong, logically effective basis, such as the consciousness revolution, for refuting the firmly entrenched, highly successful, and time-tested paradigm of scientific materialism.

Although our new mentalist paradigm in behavioral science infuses a new subjectivity into the scientific worldview, this does not extend to entities without brains. An "ecophilosophy," based on panpsychism, obviously yields rather different ethical principles from the view I describe, which is based on emergent macromental causation, including its use in comparative animal behavior (Griffin 1981). It is worth noting that those who work in neuroscience, and in related areas of brain and behavior (Doty 1975), have not been encouraged by the collective evidence encountered there (by far the most extensive and directly pertinent evidence available on consciousness and its variables) to adopt the idea of panpsychism.

Another difference concerns the concept of evolution. Berry sees the governing, directive forces of creation as present from the start, rather than self-built in graduated stages. He writes favorably of the anthropic principle (Berry 1988, 16), refers to "the primordial intention of the universe," and states that "the governing principles of the universe have controlled the entire evolutionary process from the moment of its explosive origin" (Berry 1988, 44). In the view I present, the principles governing evolution are, instead, developed in graduated stages as evolution proceeds. In accord with standard biological thinking, they are self-generated and self-organizing, not preplanned or preconceived in a "primordial intention" or "anthropic design."

Though deploring the driving values of the technological-industrial age and its shattering "assault on the earth," along with its dream of creating a wonderworld through endless material progress and growth, Berry does not implicate overpopulation. In contrast, my approach since 1965 has centered on what even then was viewed as the planet's "human surplus," which sees the environmental crisis and desecration of life as a crisis primarily of overpopulation. Our advancing technology, if separated from the population factor, I take to be part of the advance in the evolving quality of existence, something that gives added meaning and higher dimensions to the human venture—and also, let us hope, will provide space travel in time to escape our dying planet and, perhaps, control over the aging process, along with other yet-unimagined wonders

of an ever-evolving open-end future (Sperry 1988). Our two views largely agree on the profit-driven Industrial Age mind-set, bent on endless material growth regardless of the effect on nature. In my view, however, Utopia is tomorrow's technology, combined with and adapted to the population levels of centuries past.

A further difference in the two positions is Berry's stress on an extreme "interconnectedness" or "communion" between all entities of the universe, described as part of his "ecological age" perception of reality. Everything is inferred to be in intimate touch with everything else. This suddenly popular concept, in many of the new proposals and in "ecophilosophy" and "New Age" thinking, apparently derives from developments in physics relating to Bell's Theorem and the Einstein-Podolsky-Rosen (EPR) thought experiment. The interpretations are still contested, even in physics. In my case, this universal "interconnectedness," and the type of "wholeness" and/or "holism" inferred from it, are treated simply as another misinterpretation of quantum physics (Clifton and Regehr 1990). The majority of physicists still think in the old microdeterministic, exclusively bottom-up mode. They discover something they think applies to subatomic reality, then tell us the whole world works this way, forgetting that in most of nature the subatomic properties are trapped within and downwardly controlled by layer upon layer of higher systems, for which Newtonian laws work nicely but not quantum physics. Commonsense views of interconnectedness would seem adequate for the actual interdependence of different individuals, species, and habitats as stressed by ecological theory for more than fifty years. In today's context, ecology gains new appreciation and strengthened significance but is considered (for the most part) a nonissue, with respect to a shift of worldview, in that it has not been in conflict with the preceding, materialist paradigm.

A main question one keeps coming back to in trying to analyze the alleged emerging new world outlook is, namely, What developments precisely caused the downfall of the old paradigm? That is, What new evidence, concepts, or theory served to overthrow reductive materialism in favor of the new, emergent holism? The answer holds the key to the new paradigm and to understanding its implied changes for new social beliefs and values.

Having reexamined the history (Sperry 1987, 1988), I remain convinced that what caused the current outlook was primarily the turnabout on consciousness and emergent causation rather than quantum physics or relativity theory, ecology, or panpsychism—or systems theory, dualist interactionism, counterculture activism, dissipative structures, or any of the many other developments that

have been implicated. Many of these other developments contribute important features to the new world picture, but they seem to me, in themselves, either not powerful enough to have dislodged the earlier paradigm or, as with quantum physics, to lack an adequate basis for the turnabout in the scientific treatment of consciousness and values (Sperry 1987)—as well as being some fifty years off in the timing.

The related, so-called New Age Movement of the past two decades, which has increasingly challenged Judeo-Christian and other traditions of Western culture, I believe also has its foundation in the consciousness revolution. I see the spreading impacts of the new mentalist paradigm as constituting a sound core of the movement, largely obscured by a confusing welter of associated spurious (antiscientific, even occult) features. It is this sound foundational core, however, which, in my view, has kept the movement alive and growing, despite continuous and well-taken criticisms. The timing of the appearance and rise of the New Age Movement closely parallels the rise of the new mentalism in science: both were launched in the 1960s, were in full swing by the mid-1970s, and were visibly established by the mid-1980s.

Viewed in this light, the many confusing, even conflicting, facets among New Age trends fall into place and become subject to a consistent understanding. A standard is provided by which to separate those features that genuinely belong and are sound from those that are spurious or unrelated. For example, reincarnation (or "channeling"), mental telepathy, all occultisms, "Gaia" self-awareness, "Omega point," and anything else not accepted in mainstream science are ruled out. On the other hand, a transformed perception of ourselves and of physical reality, as well as a moral basis for environmentalism, population control, and sustainable economics, with rejection of the older materialist and endless-growth values—are among the features confirmed, given our new macromental model. If, as some contend, there is nothing genuine or substantial among the New Age claims—no new mode of thinking, no global mind change, no new culture emerging with new mind-sets to drive humankind toward more sustainable value priorities—then our entire species, and many others, appear to be in grave danger.

At the same time, it needs to be stressed repeatedly that our new acceptance in science of consciousness and subjectivity, the mental, cognitive, or spiritual, does *not*—as is frequently inferred—open the doors of science to the supernatural, the mystical, the paranormal, the occult, the otherworldly—or, in short, to any form

of unembodied mind or spirit. The strength and promise of the new macromental outlook is in just the opposite—that is, in taking our ultimate guideline beliefs and resultant social values out of the realm of the supernatural and otherworldly uncertainties and grounding them in a more realistic realm of knowledge and truth, consistent with science and empiric verification.

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Update

CURRENT TRENDS IN THE PHILOSOPHY OF MEDICINE

by Robert Lyman Potter

Abstract. The philosophy of medicine, a developing discipline, is defined as critical reflection on the activity of medicine. The clinical encounter is both its central aspect and the focus for philosophical analysis. The most systematic example of this discipline employs a mixture of empiricism and phenomenology. Systems thought presents an organizing schema by which the philosophy of medicine can move toward a more comprehensive and fundamental analysis of its own agenda, which includes four main topics: understanding the patient-physician interaction, concepts of health and disease, foundations of medical ethics, and the dialogue between medicine and the larger culture.

Keywords: clinical encounter; empiricism; phenomenology; philosophy of medicine; systems analysis.

The purpose of this essay is to introduce readers of *Zygon* to the philosophy of medicine, a developing field of inquiry that, when systematic, involves both the philosophy of science and the philosophy of religion among its departments of interdisciplinary study. For this reason the philosophy of medicine can be a vital topic for *Zygon,* and this article will therefore report on what has been accomplished toward attaining a systematic philosophy of medicine. A subsequent article will outline what remains to be done to incorporate

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